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Math on My Mind Equates to More Learning in Denver Area Schools

Mike Ferrara

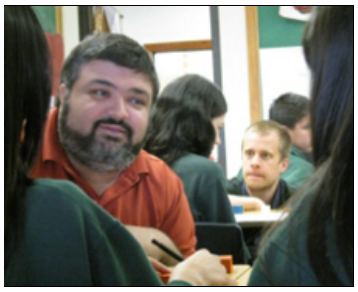
Award Winning Professor Reaching Out to Bring Math to Kids

Here's a math problem for you: if you divide the attention of one teacher among 20 students over the course of a 50-minute math lesson, how much learning does each student accomplish?

Now add two more teachers to this same math lesson, and how much better does that ratio look?

This was the kind of equation that led Mike Ferrara, assistant professor of mathematical and statistical sciences at CU Denver, to develop the Math on My Mind program. Ferrara, who won an Excellence in Teaching Award from CLAS this year, has been going into K-12 classrooms around Denver with Math on My Mind curriculum since the fall of 2009. He organizes the efforts on his own time, paying for supplies and materials out of his own pocket, because he feels so strongly about the importance of getting kids interested in math. Ferrara says, "We have a lot of programs in our department that work directly with teachers; our hope is that through our efforts we can also impact students. I thought it would be great if at the same time we could excite and interact with the students directly by getting into local classrooms and sharing the thing we love most--mathematics."

Along with his corps of CU Denver math faculty and student volunteers (all of whom donate their time and expertise to the program), Ferrara visits mainly middle schools, but has taught at nearly every grade-level K-12. During the fall 2011 semester, they led 51 classroom sessions in 15 different schools, reaching over 1,350 students. To date in 2012, the group has conducted 78 sessions for a total of 1,950 students. The mission of these sessions is simple: to make math impactful, personal, and fun for students. Math on My Mind does this by providing an innovative curriculum delivered by teachers who have great enthusiasm for getting the next generation excited about math.



Mike Ferrara (left) and Jeff Larson (right) work one-on-one with students.

Ferrara, associate professor Lynn Bennethum, and PhD candidate Jeff Larson recently brought a tub full of wooden blocks, giant smiles, and their combined expertise to four seventh-grade classrooms at the Highlands campus of West Denver Prep. Ferrara distributed the colorful blocks to students and demonstrated how the blocks could help them better understand the concepts of surface area and volume. The lesson plan, developed by Bennethum, kept students engaged, focused, and curious throughout the session.

In this particular lesson, Ferrara and Larson reviewed the concepts of volume and surface area with the students, and then began relating them to something less novel: body temperature. Starting the discussion by asking where heat escapes from buildings and from living organisms, Ferrara then explained how the circulatory system has to work against the cooling that takes place on the skin to keep them warm. Students were then asked to imagine that two of the wooden blocks were a mouse, and to calculate this mouse-model's volume and surface area. Taking it a step further, Ferrara explained how accelerated heat rates result in increased body temperatures, and then tied together the lesson by having the students predict heart rates for mice, rats and other animals based on their surface area and volume.

"This is outstanding," commented Shelly Parker, the West Denver Prep math teacher who allowed Math on My Mind to visit her classes. "The students had already studied all this stuff, but this brought it to them with real world examples and hands-on experience. I think today drove it home in ways we didn't before?plus Mike and Jeff were just awesome with the kids."

Shelly Parker (left), Jeff Larson (center) and Mike Ferrara (right) work with one of the classes at West Denver Prep.

"It is our goal to try and illustrate new or challenging ideas in fun and engaging ways so that we can, hopefully, help students make critical connections and at the same time show them that the math they are learning can be both useful and fun, " comments Ferrara. "My favorite question from that age group is 'Why is this math?' Because then you know you are about to have a discussion that will open their eyes to all that math is. No matter the grade level, the most important thing is to be positive, energetic, and prepared to adjust your pace."

Ferrara comes from a family of K-12 teachers, so he is right at home in a seventh-grade classroom. "My first real job in high school was as a children's party clown, and I was pretty sure I would end up becoming a pediatrician after college, but I always knew I wanted to be working with kids. Being a teacher, you get to fill a lot of roles for the kids?a little bit party clown, and then of course a lot of other things as well."

During the session at West Denver Prep, Ferrara and Larson introduced themselves as "Dr. Mike" and "Almost Dr. Jeff," explaining that Jeff Larson is a PhD candidate who will finish school over the summer and will then become a "Math Doctor." As Larson circulated around the room to help students with the problem on the board, several students asked him how much school he had completed and what jobs were open to someone with a math PhD. The students said that they liked math and were interested in it and having "Math Doctors" in the room made them curious about options for future math careers.

Larson will get his PhD this summer, but he's a natural in the classroom after spending two years in the GK-12 program, a National Science Foundation-funded grant run through CLAS since 2009. This program puts CU Denver students from multiple disciplines into classrooms around Denver. Larson does research on the analysis and implementation of algorithms for optimizing noisy simulations, and after graduation will be moving to Stockholm for a two-year postdoctoral research position at a Swedish university, but he volunteers his time with Math on My Mind because he says, "I love broadening students' perception of what mathematics can do. Seeing their excitement and intensity for working with new problems and applications makes me even more interested in helping in other schools."

Ferrara credits the success of Math on My Mind to his team of about a dozen trained and motivated co-teachers, saying, "I'm just really lucky to have such a great set of volunteers. Give people who are passionate about math the chance to tell kids about it and they really shine. And they have really shown up for this." In the future, Ferrara would love to have resources to expand the program, adding that "While we could certainly use some funds for materials and supplies, in the long term it is my hope to be able to fund a graduate teaching assistant, like Jeff, so they could devote their teaching energies to Math on My Mind during the semester. Having a dedicated TA would allow us to reach a much larger number of schools, and we could certainly run more frequent and detailed training sessions. An extra pair of hands would also allow us to create clearer and more detailed versions of our lesson plans, which would greatly help our less experienced volunteers as they learn the ropes; and could also be shared with the larger mathematical community in the hopes of getting more mathematicians involved in their own communities."